

Introduction

At the macro level, the United Kingdom (UK) healthcare worker (HCW) influenza immunisation programme and influenza vaccines are inserted into National Health Service (NHS) organisations, such as NHS Trusts (England) and Health Boards (Wales and Scotland) by human and non-human heterogeneous actors: international organisations (World Health Organisation, European Centre for Disease Prevention and Control (ECDC)); national organisations (UK Government, Welsh Assembly Government (WAG), National Public Health Service (NPHS), Public Health Wales (PHW), Health Protection Agency (HPA), Public Health England (PHE)); UK Legislation; Chief Medical Officers (England and Wales); national mandatory training (e.g. anaphylaxis) and optional training (e.g. influenza). At the micro level, the programme and vaccines are inserted into healthcare workers themselves by heterogeneous actors, including discourses around influenza viruses and other diseases, influenza vaccines and other vaccines, education/training/knowledge about influenza and vaccines.

A less studied area is the meso level, which can be seen to link these micro and macro levels. Actor-network theory (ANT) argues that macro- and meso-level entities can only work and be understood at a micro-level. As an Actor-network Theory (ANT) paper, the meso-level of the UK healthcare worker influenza immunisation programme will be analysed at a micro-level. The meso-level here is understood to be the Local Health Boards (LHBs) and associated hospital institutions where the immunisation programme is administered by (micro-level) clinical teams. These teams are made up of heterogeneous actors from Occupational Health, Emergency Planning, Infection Prevention and Control, Public Health and clinical

hospital departments. These actors are simultaneously actors in heterogeneous health professional networks, namely Medicine, Nursing and Midwifery.

In order to produce the analysis, an ANT approach to empirical qualitative data is taken. The data is drawn from 13 interviews with health professionals employed by two Local Health Boards (LHBs) in Wales. The informants comprise of: Directors of Medicine, Nursing, Midwifery and Occupational Health; Emergency Planning and Infection Control Professionals; Occupational Health Nurse Managers; and, Nursing and Midwifery Vaccination Champions. All of the informants are involved in planning and/or administering the HCW influenza immunisation programme in their respective LHBs. It is the planning and administering of this programme which will be the focus of this paper.

For while the NHS HCW influenza immunisation programme has power '*in potentia*', it is powerless '*in actu*' until actors in the network perform actions, or do work in the net, of the NHS HCW influenza immunisation programme actor-world (Callon 1986). The programme only exists as long as the actors in the actor-network are enrolled and mobilised in it. Power is a consequence of, and not the reason for, action.

Occupational health and HCW influenza vaccination

In 2001, the then Chief Medical, Nursing and Pharmaceutical Officers for England declared that: 'Responsibility for occupational influenza immunisation rests with the employer and it should be provided through an occupational health service' [1]. This problematisation, and its associated intersement (which is not explored here), has resulted in NHS OH staff being enrolled as pivotal actors in the UK HCW influenza

immunisation network. From this position, NHS OH staff enrol and mobilise, as agents of the UK government, NHS resources and other HCWs. In addition to OH actors, other multi-disciplinary actors are also enrolled and act as enrollers in this network.

Despite this longstanding enrolment, however, OH professionals reported that they have only recently become mobilised as key actors within the immunisation programme network:

“probably for the first 10 years...I don’t even remember it being significant...I’d say in the last 5 years maybe that’s when the flu vaccine has become more of an issue. It was really a take it or leave it”.

The same informant also compared the durability of this programme with the HCW Hepatitis B immunisation programme:

I remember Hepatitis B coming in in the late 80s, and when I joined Occupational Health in 1990 there was still a big drive for that.

Other OH professionals also commented on the perceived relatively recent nature of the HCW influenza immunisation programme; despite its duration of more than a decade.

This mobilisation has generated a variety of challenges, some arising from conflicts with the enrolment of OH staff in other networks with other requirements and some from the enrolment of other actors with divergent goals or motivations. Ultimately, the immunisation programme requires OH staff to create a stable network that brings together a non-human actor, the vaccine, and human actors, willing frontline HCWs, in the same place at the same time.

The first challenge is to mobilise OH staff themselves. Some are clearly ambivalent about the HCW vaccination programme:

I'd say there's 1 or 2 individuals [OH professionals] who um have actually expressed their feelings that no we don't agree with vaccinating, we don't agree with vaccinating pregnant women...even within the Occupational Health Department there were some individuals who were not convinced that the [pandemic] vaccine was that helpful. So if you've got someone who says "I'm not really sure", if the person giving the vaccination don't have their own positive commitment to it and basically you'll end up with the person not having the vaccination.

OH nurses have a major role within the department in determining the planning and timing of vaccination campaigns:

the decision makers in that process would be predominantly be the two senior nurse managers. Because it's delivered predominantly by the nursing team and the same with sort of ordering supplies of the vaccine in sort of April, May or, of the preceding season if you like.

The use of OH nurses to administer in HCW vaccination campaigns was, however, regarded as questionable:

is that an effective use of senior nurse practitioner time because vaccinations can be administered by a band 5 nurse which costs a fraction of a band 7, band 8. A band 7, band 8 nurse will be doing other skills whereas the band 5 nurse will only vaccinate. And some of the sort of team talk recently has been "well if we have a concerted push on vaccination should we just call in agency staff to be able to vaccinate, that's their set purpose they get through as many as they can". There were cost constraints on that and the idea was quashed.

But in reality if you look at it from a slightly different perspective, yeah it may cost a bit more money but you're actually having a very big positive win, lots of people should be vaccinated because you're more freely available. But on the other hand your existing staff will be able to carry on with their normal work.

The use of the term 'normal work' by this informant presents the vaccination programme as something abnormal, in tension with the 'proper work' of the OH department. Another OH informant contrasted the programme with their department's 'necessary work':

So you've still got to do your day to day work, you've still have to keep, you know, do the necessary work of the department.

The same informant drew attention to the role of a non-human actor, the Patient Group Directive (PGD)¹, in destabilising the nurses' contribution to the vaccine network:

the difficulty with looking at nurses delivering the front end of the service is that they will not go outside that constraints of that PGD. If they do the concern is well we would not be covered by our professional body, be it the Nursing or Midwifery Council. We may not be covered by litigation liability from the trust if that person keeled over and was ill. So having very tight criteria and playing by the rules as they had been written, and it being driven by nurses meant that you wouldn't do it. If we wanted someone to have a

¹ A Patient Group Direction (PGD) or Patient Specific Direction (PSD) are legal documents which allow qualified health professionals, who are unable to write prescriptions, to supply and/or administer Prescription Only Medicines (POMs) and Black Triangle Vaccines (in certain circumstances) (Health Service Circular, 2000/026). 'PGDs are defined as written instructions for the supply or administration of medicines to groups of patients who may not be individually identified before presentation for treatment (SI 2000/1917)' Salisbury et al, 2006: 35[2]).

vaccination who is not in that Patient Group Directive then...a medic...would write a separate prescription and do it without any particular problems.

Another intrusive non-human actor is the record that OH departments are expected to keep ‘...of staff immunised and monitor the effectiveness of their programme’ [1] (pp. 4-5):

got the additional work to put the data on...the figures we’ve got to send to...that’s real hard work. They’ve changed the system this year, it was really hard. Before it was just a tick box, and we send the tick box form to him and they enter the data on it but now we’ve got to look at the denominators, we’ve got to look what they work, which group they come into, awful time consuming.

The level of OH staff mobilisation is critical to the stabilisation and performance of the vaccination network. Some staff are constrained by the actions of other agents like the Patient Group Directive (PGD). There is competition from the claims of other networks in which staff are enrolled: campaign timing, for example, can be affected by OH staff annual leave plans. Finally, there is competition from the ‘normal’ or ‘necessary’ work of the OH department, where staff do not share others’ view of the priority to be given to vaccination relative to other claims on their time and resources. Nevertheless, some staff do succeed in ‘black-boxing’, or stabilising, their role in the HCW influenza immunisation programme:

We like the flu campaign because we know exactly what we’ve got to deal with, when it is, the timescale we’ve got to get them out and the satisfaction we get then because you know when we see our cohort and you see this heck of a list of people you vaccinated.

Mobilisation of the OH department's staff does not, however, ensure that the vaccine and the frontline HCWs will be united.

Enrolling HCWs

The relational ontology of the vaccine programme network defines HCWs simultaneously as 'consumers', choosing to go to their OH department to be vaccinated every year, and as 'recipients', who need to be encouraged by OH staff, and by non-human actors such as posters, leaflets and staff intranet announcements, to attend for, and accept, influenza vaccination. OH staff both emphasised and problematised their own role in enrolling HCWs by persuading them to accept vaccination:

You've got to be assertive with them you know and I think it gives them the impression then that either, you know, we bully them or we really care about the staff and we do, we care about the staff, we don't want them to be ill.

Similarly, OH staff complexified their role as vaccination enrollers:

I'm trying to sell patient, self and family but I think it's family, self, patient. So we started to change our tack and go "cover yourself". I mean I've always had the emotional blackmail but we started to change our tack to fit in with what we were sensing was what's most important to this person.

While these quotes portray OH staff as caring health professionals concerned about the health of their HCW clients, they also exhibit concern about being perceived to use bullying or blackmail to achieve HCW enrolment in the vaccination programme. At what point does the encouragement of consumers to be recipients spill into coercion, with the risk of disrupting the network's ontology?

This is compounded by the frequent need to enrol and mobilise 'at a distance' because OH staff have limited direct engagement with frontline HCWs. OH staff must first enrol a variety of intermediaries, who are themselves subject to competing network claims and who may not necessarily appreciate the vaccine programme's complex relational ontology :

You can email the heads of department, cover community, speech and language, occupational therapy; it's down to the heads of department then to get that message out to their staff you know. And we don't have any messages back; you know we don't have the managers feeding back to us to say they can't get hold of such and such. We're relying on managers to actually get it out to staff you know (Occupational Health Professional).

Some OH departments enrol specific vaccination champions, usually nurses or midwives working in other departments, to help encourage and/or administer HCW influenza vaccinations. The use of champions was also a problem for the network because of the lack of control over their relationship with hybrid or non-human actors recruited by the OH department:

But taking into account now, if you allocate a champion and then you're going to provide vaccines within that area, in their fridge [for them to administer locally], there are a lot of details to knowing that the vaccine is stored properly, that a consent is filled in properly, it's signed, that the cold chain is maintained you know. And these things you've got to take into account.

The enrolment of frontline HCWs into the vaccination network lies, then, at the end of an uncertain and fragile chain of actors and relationships. Complexity is further increased by the rationing of vaccination, which restricts enrolment to those frontline HCWs directly employed by the health boards.

we felt that, learning again from pandemic, you have a queue of people waiting and they got to the front and they weren't eligible because they worked in an office...then they were upset and they were angry. So that happened quite a lot...It's like the haves and the have nots...we were really scraping the barrel to give people vaccine.

OH staff are challenged to stabilise the network by mediating between the vaccine, policy documents governing its usage, and potential vaccinees, whose eligibility for enrolment ultimately turns on practical local decisions about the fit between these three agents.

Enrolling vaccines

Vaccines, as non-human actors, can only join the network if they are actually purchased. Their enrolment begins with instructions from another non-human actor, a letter from the Chief Medical Officer instructing Health Boards/Trusts to decide, through their OH departments, how much vaccine to order and when to order it:

It is up to individual Trusts/employers to determine their own programme and fund the immunisation of their staff. It is important for Occupational Health services to place orders for the vaccine they need as early as possible [1] (p. 4-5).

At the same time, the recipients are also instructed that:

Vaccine for staff should not be obtained at the expense of vaccine for the risk groups. Staff should not be asked to go to their GP for their immunisation unless they fall within one of the recommended high-risk groups, or GPs have been contracted specifically to provide this service [1] (pp. 4-5).

The guidance simultaneously prioritises and de-prioritises the vaccine's enrolment by OH departments, leaving local decision-makers to resolve the conflicting requirements.

In the localities studied, there seemed to have been little attempt to develop an explicit resolution on the enrolment of vaccines. OH departments must enrol the HB/Trust Medical Director to sanction payment:

The health board doesn't shout at me for going £21,000 overspent on my budget on flu vaccine. My drugs budget is continuously overspent and I say 'it's for flu' and the Medical Director said to me "If anybody picks you up on that...please direct them to me". So the health board allows Occupational Health to go a bit behind on its waiting times in order to deliver. So indirectly the health board is very supportive of the flu vaccination programme. How individuals within that [the Health Board] I don't know. But the Medical Director, Planning, Infection Control, yeah... I don't think they've even begun. I hear a lone voice, I hear the Medical Director.

The process by which order levels were determined was opaque, as reported by OH professionals:

It's usually taken on last year's figures with a 10% upgrade.

But um it's knowing the balance that how much do you order and how much wastage you have after, it's a cost on the NHS as well.

Well historically, until this year, that's been done by looking at the previous years', and I mean more than one, uptake and trying to order to a level that

you would reasonably predict based on that. So that we don't over order and waste vaccine.

When asked 'Is that seen as more of a sin than under-ordering and maybe turning people away?', one response was:

I think both are really, I think it's a no win situation. I think it's very difficult to know how best to do it. So we've always ordered vaccine on the basis of sort of anticipated uptake of a vaccine of about ten percentish, give or take a few percent and obviously then the situation changed during the pandemic campaign...But as with everything it's a question of balancing what resources you've got and what the need is.

The OH department's limited enrolment into the network of decision making around vaccine orders does not create a strong incentive for them to promote vaccination and increase HCW enrolment:

I don't think there's any more [to be gained] in promoting the seasonal flu [vaccine], there's no more that anybody could do with the health board to be honest with you.

The enrolment of vaccines is no more certain or stable than that of HCWs.

The 2009-10 influenza A (H1N1) pandemic HCW immunisation programme

The 2009-10 influenza A (H1N1) pandemic was reported by OH staff to be a pivotal moment in the HCW influenza immunisation programme actor-network. As an OH Professional stated:

pandemic was kind of like a line if you like to be crossed... the improvement was vertical during the pandemic and we've tried to keep that and build on it.

The HCW influenza immunisation programme network is described by OH staff as a small engagement compared with their roles in other networks - carrying out new entrant screening, staff sickness absence returns, health promotion and other vaccinations, such as hepatitis B. However, during the 2009-10 pandemic, more active mobilisation was demanded:

There was an acceptance that there would be perhaps delays if you like or that would have an adverse effect on some of the other things we do and even some things would stop whilst those services were being delivered, more so than happens in a seasonal campaign... Well we didn't do any health promotion work during the pandemic flu that I can recall. And there would be some delays on perhaps, you know, sort of new entrant health screening. I don't think there were any delays that I know of caused any significant operational problems. But, and routine immunisation programmes were also delayed a bit as well...We had to take it right through to the February, whereas normally the end of December would be the finish of our seasonal vaccines, we continued through to February.

The 2009-10 pandemic immunisation programme accentuated the challenges of the the seasonal programmes. As an OH Professional contended:

It was a significant burden really on our resources in so far as particularly it tied up a lot of nursing resource, both in the planning and the execution of the campaign.

Another OH Professional went further, to contend that the HCW pandemic influenza campaign:

led to people seeing Occupational Health as a vaccinating service, not being able to support employees with health related problems... it needs to be not seen as an Occupational Health focused um problem, for want of a better word. It's almost as though vaccination equals Occupational Health in the months of October, November, December... the department does lots of other things and it's almost an expectation "well why can't you do it, you should be doing it". And that's almost a sort of an inclusivity or an exclusivity which isn't right. This is a Health Board issue; everyone who gets paid by this health board has some involvement in it.

This problematisation led to a more self-conscious attempt at interestment, directed at managers from other departments to secure active enrolment in the network promoting the pandemic immunisation campaign. Their enrolment remained voluntary and mobilisation was patchy. Nevertheless OH staff saw potential long term implications for drawing other colleagues into the seasonal HCW immunisation campaign network:

You know I'm thinking about planning now our flu campaign and I'm meeting with our Immunisation Co-ordinator and our Emergency Planning Lead...Never would have thought of even, the flu campaign was our domain. Why would I want to meet with anybody else? That's what Occupational Health do. So you forget that since then, like the 3 witches around a coven, but you find that kind of network and support and what does the Immunisation Co-ordinator get in place and what's Emergency Planning going to offer us that. It's changed practice, it's just changed practice.

A bigger challenge came from changes in non-human actors, the vaccine and its delivery system, which required adjustments from the human actors. The vaccine

now appeared in two different guises, which OH staff reported needed to be handled differently:

The other thing, thinking back to that time, there were two different preparations I think in terms of vaccination and there were concerns particularly from the nurses who were administering it, you had to make it up with a different diluents. Umm which again didn't actually make it run very smoothly.

Where the seasonal vaccine had black-boxed the circumstances of its production history, the pandemic vaccine exposed these to a greater extent and made different demands on its human partners in administration. These were reinforced by changes in the technical instruments for injecting the vaccine. Seasonal vaccine was supplied in single-dose pre-filled syringes (PFS), but the pandemic vaccine came in a ten-dose vial, which had to be drawn up by vaccine administrators into individual syringes. This was more time consuming and could lead to more wastage if the cold chain were broken when administering the vaccine to HCWs. Some OH staff also asserted that lower quality syringes and needles had been supplied. Combined with the greater viscosity of the pandemic vaccine, this made injections physically more difficult to perform. Key informants from the nursing profession went so far as to suggest that repetitive strain injury (RSI) could result. The vaccine network was destabilised by these changes in the action of non-human members.

HCW influenza immunisation programmes since the 2009-10 influenza A (H1N1) pandemic

Since the 2009-10 H1N1 influenza pandemic, seasonal vaccine uptake rates have significantly increased, according to OH informants. A number of explanations were proposed. The pandemic influenza virus A(H1N1)pdm09 was a new key actor in the pandemic HCW influenza immunisation programme, encouraging HCWs to enrol and mobilise HCWs as recipients and vaccination champions in the network. This level of mobilisation has continued. The A(H1N1)pdm09 virus has acted to stabilise the HCW influenza immunisation programme network by persuading HCWs that influenza is a serious illness that threatens them, their families and their patients. Previous seasonal influenza viruses failed to achieve this to the same extent. Both health boards reported that OH departments were now seeking more direct engagement with frontline HCWs with an increased use of mobile vaccination units (rather than HCWs having to attend the OH department). They were less reliant on enrolment at a distance. However, OH staff have also enrolled and mobilised more organisational partners, whether line managers or vaccine champions. In effect they have recognised that the problematisation that created the vaccine network needs to be shared more widely as a means of interessement directed at key intermediaries between the department and the frontline HCWs whose enrolment and mobilisation is critical to the performance of the network. The pull of the vaccination network has re-shaped OH staff engagements, with implications for their mobilisation in other networks that are not explored here.

During the 2011-12 winter season, both health boards were set an HCW immunisation target by their national Public Health service. One health board,

however, decided to aim for their own, lower, target. Key informants problematised the Public Health immunisation target and cast doubt on their ability to reach it. In both boards, key informants questioned OH departments' ability to reach even higher future targets. At the same time, OH staff were showing that the network could be enlarged and stabilised by the enrolment of more vaccination champions and new human actors in the form of agency staff to vaccinate.

Vaccination champions

As already discussed, non- OH professionals have been involved as human actors doing work in this network. Nurses and midwives working as vaccination champions have been considered from the point of view of OH professionals. The work of these non OH professionals as enrollers, champions and immunisers will now be considered in more detail from their own perspective. In particular, the interviews with key informants and nurses and midwives working as vaccination champions in this network will be considered.

A non OH immuniser contended that her immunisation programme was so successful because she was more easily accessible to the HCWs who worked in the same department as her; both in terms of physical location, visibility (yellow t-shirt) and the times in which she was available to vaccinate. She contended that geographical proximity of her immunisation service is an important factor for her department (which is very busy) and professional groups (whose work is unpredictable). However, she also problematised the time that being constantly available took up but deproblematised this to some extent by reporting that her manager was very supportive of the time she spent on the immunisation programme. In addition, she identified the Immunisation Co-ordinator from the LHB Infection

Prevention and Control Department and OH professionals to be key actors in the network, providing crucial support and training for vaccination champions.

Furthermore, she contended that local knowledge of colleagues' shift patterns allowed her to target unvaccinated HCWs. The vaccination champion also stated that she felt colleagues were more likely to accept vaccination from a colleague than from an OH professional because they trusted her judgement in promoting influenza vaccines and that she was approachable to ask any questions to. She also proposed that her long experience as a midwife and in that particular department, good relationship with colleagues increased her perceived trustworthiness.

The vaccination champion, however, did problematise the role due to the instability of the network:

But you have got to keep the profile up constantly got to remind people 'have you had your flu vaccination?'. You've constantly got to remind people 'have you had your flu vaccination', you know that sort of thing. So it's not just running the clinics it's also keeping the profile going.

Conclusion

This paper has considered the role of macro and micro level actors enrolled in the UK NHS HCW influenza immunisation programme network. These actors are linked at the meso level of the LHBs and hospital institutions where they do work to insert influenza vaccines into the hospitals and ultimately into HCWs as vaccinees.

This network has been stabilised for the present by the actions of the A(H1N1)pdm09 virus, and by the threatened intervention of future influenza viruses,

particularly from avian sources. OH professionals and departments remain, and will continue to be, key actors in this network. In addition, due to and since the pandemic, mobile vaccination clinics and non-OH vaccination champions have been enrolled and mobilised in the network. However, the network's stability remains fragile. Those organisations responsible for the problematisation that has created HCW influenza vaccination programmes in the UK (DH, NHS Trusts, and OH Departments) need to consider how the interestment of network actors, both human and non-human, can be sustained and translated into active enrolment and mobilisation. This will involve thinking about the ways in which membership in the vaccination network intersects with potentially competing network memberships. How can a cadre of human and non-human actors be sustained in ways that preserve a stable core to the actor-network that will facilitate rapid expansion when required? Can the system achieve 'stabilisation in advance' [3], the creation of actor-networks that are primed for rapid mobilisation by a newly-arrived non-human actor, an influenza virus with pandemic potential?

References

1. Donaldson L *Influenza immunisation programme 2001/2002 (letter)*.
Department of Health (London) 2001; PL/CMO/2001/4.
2. Salisbury D, Ramsay M, Noakes K. Immunisation against Infectious Disease.
The Stationery Office, London: 35-9, 2006.
3. Dingwall, R., Hoffman, L. M. and Staniland, K., Introduction: Why a Sociology of Pandemics?. *Sociology of Health & Illness* 2012 doi: 10.1111/1467-9566.12019.

